

rain area and the storm advanced to New England, and on the 29th it had dissipated.

XIV.—On the 30th and 31st a feeble low formed on the west Gulf Coast, but it caused considerable rain in Texas and Louisiana on the 30th, and also in the Gulf States generally during the 31st.

XV.—On the morning of the 31st a low was formed over the Lakes, at the northern end of the trough, corresponding to which XIV was at the southern extremity. In the evening a well-marked low was central over New Jersey; this may have been a new configuration resulting from the collapse of the trough, which rapidly filled during the day. The rain area was very general east of the Mississippi River during the 31st.

LOCAL STORMS.

By A. J. HENRY, Chief of Division of Records and Meteorological Data.

There was a notable absence of local storms and destructive winds over the greater portion of the United States. Not since 1886 have so few storms, either general or local, been reported. The record is as follows:

On the 10th a heavy southwest wind prevailed over Lake Michigan, injuring cargoes and wrecking 2 or 3 schooners.

Heavy rains and dangerous gales occurred on the night of the 13th throughout southeastern New England. At Boston, 3.22 inches of rain was reported and shipping in the harbor was injured, but no serious disaster resulted. At Providence, R. I., a large unfinished school building was wrecked. At Portsmouth, N. H., the storm was severe; cellars were flooded and electric wires torn down.

TEMPERATURE OF THE AIR.

[In degrees Fahrenheit.]

The mean temperature is given for each station in Table II, for voluntary observers. Both the mean temperatures and the departures from the normal are given in Table I for the regular stations of the Weather Bureau.

The monthly mean temperature published in Table I, for the regular stations of the Weather Bureau, is the simple mean of all the daily maxima and minima; for voluntary stations a variety of methods of computation is necessarily allowed, as shown by the notes appended to Table II.

The regular diurnal period in temperature is shown by the hourly means given in Table IV for 29 stations selected out of 82 that maintain continuous thermograph records.

The distribution of the monthly mean temperature of the air over the United States and Canada is shown by the dotted isotherms on Chart II; the lines are drawn over the high irregular surface of the Rocky Mountain Plateau, although the temperatures have not been reduced to sea level, and the isotherms, therefore, relate to the average surface of the country occupied by our observers; such isotherms are controlled largely by the local topography, and should be drawn and studied in connection with a contour map.

The highest mean temperatures were: Key West, 78.6; Yuma, 75.5; Jupiter, 75.8. The lowest mean temperatures were: In Canada—White River, 30.0; Minnedosa, 33.7; and Qu'Appelle, 33.8. In the United States—St. Vincent, 39.0; Sault Ste. Marie, 39.6; and Northfield, 39.2.

As compared with the normal for October, the mean temperature for the current month was deficient everywhere east of the Rocky Mountains, but in excess over the Plateau Region.

The greatest excesses were: Red Bluff, 4.0; Calgary and Spokane, 3.2; Salt Lake City, 3.1; Baker City, Sacramento, and Yuma, 3.0. The greatest deficits were: Detroit, 6.9; Erie, 6.5; Louisville, 6.2; Sandusky and Toledo, 6.1.

Considered by districts, the current departures from normal temperatures are as given in Table 1. The greatest positive departures were: Middle Plateau, 2.0; northern Plateau, 2.5. The greatest negative departures were: Lower Lake, 5.7; Ohio Valley and Tennessee, 5.1; Abilene (southern Slope), 4.6.

The years of highest and lowest mean temperatures for October are shown in Table I of the REVIEW for October, 1894. The mean temperature for the current month was not the highest on record at any regular station of the Weather Bureau. It was the lowest on record at Port Huron, 44.0; Detroit, 45.4; Erie, 45.8; Cleveland, 46.7; Sandusky, 47.2; Springfield, Ill., 49.5; Toledo, 46.2; Chicago, 46.2; Green Bay, 42.4; Davenport, 47.4; Des Moines, 48.2; Columbus, 48.2; Cincinnati, 51.2; Indianapolis, 49.4; Louisville, 53.1; Kansas City, 53.2; Springfield, Mo., 53.0; Fort Smith, 56.8; Little Rock, 58.6; Abilene, 60.6; Louisville, 53.1; Lynchburg, 53.5.

The maximum and minimum temperatures of the current month are given in Table I. The highest maxima were: 99, Yuma (2d); 95, Fresno (1st); 94, Red Bluff (14th). The lowest maxima were: 65, Block Island (8th), Pysht (18th), Port Angeles (20th); 66, Nantucket (frequently), Wood's Hole (3d), Alpena (2d). The highest minima were: 70, Key West (22d); 64, Jupiter (23d); 63, Port Eads (frequently). The lowest minima were: —3, Williston (29th); —2, Bismarck (29th); 3, Moorhead and Huron (29th); 4, Pierre (29th).

The years of highest maximum and lowest minimum temperatures are given in the last four columns of Table I of the current REVIEW. During the present month the maximum temperatures were the highest on record at: Columbia, 92; Corpus Christi, 90; Astoria, 76; Fort Canby, 83; Tatoosh Island, 72; Port Angeles, 65. The minimum temperatures were the lowest on record at: Sault Ste. Marie, 18; Port Huron, 19; Erie, 23; Indianapolis, 22; Columbus, 20; Parkersburg, 20; Lexington, 23; Louisville, 26; Keokuk, 20; Kansas City, 26; Wichita, 29; Concordia, 20; Pueblo, 19; Lander, 10; Rapid City, 10; Pierre, 4; Huron and Moorhead, 3; Bismarck, —2; Williston, —3; Portland, Oreg., 31; Carson City, 20.

The greatest daily range of temperature and the extreme monthly ranges are given for each of the regular Weather Bureau stations in Table 1, which also gives data from which may be computed the extreme monthly ranges for each station. The largest values of the greatest daily ranges were: Huron, 55; Bismarck, 54; Havre, 52; Rapid City, North Platte, and Columbia, Mo., 50. The smallest values were: Key West, 13; Jupiter, 15; Galveston and Port Eads, 17; Hatteras and Nantucket, 18. Among the extreme monthly ranges the largest values were: Bismarck, 86; Williston and Pierre, 83; Huron and Moorhead, 78; Rapid City, 75; St. Vincent, 70. The smallest values were: Key West, 17; Port Eads, 19; Jupiter, 21; Titusville, 28; Tampa, Hatteras, Block Island, and Nantucket, 29.

The accumulated monthly departures from normal temperatures from January 1 to the end of the current month are given in the second column of the following table, and the average departures are given in the third column, for comparison with the departures of current conditions of vegetation from the normal conditions.

Districts.	Accumulated departures.		Districts.	Accumulated departures.	
	Total.	Average.		Total.	Average.
New England	+ 0.1	0.0	Middle Atlantic	— 9.7	— 1.0
Upper Lake	+ 0.5	0.0	South Atlantic	— 16.2	— 1.6
North Dakota	+ 5.0	+ 0.5	Florida Peninsula	— 18.8	— 1.4
Missouri Valley	+ 3.1	+ 0.3	East Gulf	— 17.4	— 1.7
Northern Plateau	+ 3.5	+ 0.4	West Gulf	— 17.5	— 1.8
			Ohio Valley and Tenn.	— 13.1	— 1.3
			Lower Lake	— 7.2	— 0.7
			Upper Mississippi	— 0.9	— 0.1
			Northern Slope	— 9.8	— 1.0
			Middle Slope	— 4.6	— 0.5
			Abilene (southern Slope) ..	— 18.3	— 1.8
			Southern Plateau	— 6.3	— 0.6
			Middle Plateau	— 10.1	— 1.0
			North Pacific	— 2.2	— 0.2
			Middle Pacific	— 6.0	— 0.6
			South Pacific	— 7.9	— 0.8

The limit of freezing weather is shown on Chart VI by the isotherm of minimum 32°, and the limit of frost by the isotherm of minimum 40°.

MOISTURE.

The quantity of moisture in the atmosphere at any time may be expressed by means of the weight contained in a cubic foot of air, or by the tension or pressure of the vapor, or by the temperature of the dew-point. The mean dew-points for each station of the Weather Bureau, as deduced from observations made at 8 a. m. and 8 p. m., daily, are given in Table I.

The rate of evaporation from a special surface of water on muslin at any moment determines the temperature of the wet-bulb thermometer, but a properly constructed evaporimeter may be made to give the quantity of water evaporated from a similar surface during any interval of time. Such an evaporimeter, therefore, would sum up or integrate the effect of those influences that determine the temperature as given by the wet bulb; from this quantity the average humidity of the air during any given interval of time may be deduced.

Sensible temperatures.—The sensation of temperature experienced by the human body and ordinarily attributed to the condition of the atmosphere depends not merely on the temperature of the air, but also on its dryness, on the velocity of the wind, and on the suddenness of atmospheric changes, all combined with the physiological condition of the observer. The condition of the atmosphere as to moisture is so important that it has, by exaggeration, been sometimes considered as a controlling feature and the temperature of the wet-bulb thermometer, when whirled in the shade, has been called the sensible temperature, although this is often but a partial index of the sensation of temperature. In order to present a monthly summary of the atmospheric conditions on which hygienic and physiological phenomena depend, the moisture must be fully considered, and therefore Table VIII has been prepared, showing the maximum, minimum, and mean readings of the wet-bulb thermometer at 8 a. m. and 8 p. m., seventy-fifth meridian time. A complete expression for the relation between atmospheric conditions and nervous sensations is under consideration, but has not yet been obtained.

PRECIPITATION.

[In inches and hundredths.]

The distribution of precipitation for the current month, as determined by reports from about 2,500 stations, is exhibited on Chart III. The numerical details are given in Tables I, II, and III.

The precipitation for the current month was heaviest, 20.00 to 24.00, on the southeast coast of the Florida Peninsula; but least, namely, between 0.00 and 0.5, over all the region, with a few local exceptions, between the Lake Region and the Ohio Valley, westward to Wyoming and Montana, and thence throughout the Rocky Mountain Plateau and Pacific Coast regions.

The diurnal variation is shown by Table XII, which gives the total precipitation for each hour of seventy-fifth meridian time, as deduced from self-registering gauges kept at about 43 regular stations of the Weather Bureau; of these 37 are float gauges and 6 are weighing gauges.

The normal precipitation for each month is shown in the Atlas of Bulletin C, entitled "Rainfall and Snow of the United States, compiled to the end of 1891, with annual, seasonal, monthly, and other charts."

The current departures from the normal precipitation are given in Table I, which shows that there was an excess in the Florida Peninsula, but a deficiency everywhere else, a few localities only excepted. Large excesses were: Jupiter, 15.9; Meridian, 1.9; Pueblo and Abilene, 1.1. The large

deficits were: Tatoosh Island, 7.9; Neah Bay, 11.0; Astoria, 6.4; Fort Canby and Jacksonville, 5.1; Charleston and Hatteras, 3.6; Eastport, 3.5.

The average departure for each district is also given in Table I. By dividing these by the respective normals the following corresponding percentages are obtained (precipitation is in excess when the percentages of the normals exceed 100):

Above the normal: South Atlantic, 178; Abilene (southern Slope), 136; southern Plateau, 112.

Below the normal: New England, 69; Middle Atlantic, 73; South Atlantic, 36; east Gulf, 72; west Gulf, 64; Ohio Valley and Tennessee, 43; lower Lake, 54; upper Lake, 33; North Dakota, 22; upper Mississippi, 14; Missouri Valley, 12; northern Slope, 62; middle Slope, 78; middle Plateau, 40; northern Plateau, 1; north Pacific, 8; middle Pacific, 8; southern Pacific, 35.

The years of greatest and least precipitation for October are given in the REVIEW for October, 1894. The precipitation for the current month was the greatest on record only at Jupiter, 21.03. It was the least on record at: Eastport, 1.15; Northfield, 0.45; Port Huron, 0.85; Alpena, 0.77; Grand Haven, 0.43; Duluth, 0.09; Pierre, trace; Rapid City, 0.02; Omaha, 0.07; Kansas City, 0.12; St. Louis, 0.23; Salt Lake City, 0.24; Eureka, 0.05; Roseburg, 0.00; Portland, Oreg., trace; Astoria, 0.23; Fort Canby, 0.31; Tatoosh Island, 1.32; Neah Bay, 1.27; Port Angeles, 0.15; Spokane, trace; Walla Walla, 0.00.

The total accumulated monthly departures from normal precipitation from January 1 to the end of the current month are given in the second column of the following table; the third column gives the ratio of the current accumulated precipitation to its normal value.

Districts.	Accumulated departures.	Accumulated precipitation.	Districts.	Accumulated departures.	Accumulated precipitation.
	Inches.	Per ct.		Inches.	Per ct.
Florida Peninsula.....	+ 0.50	101	New England	- 6.60	82
Abilene (southern Slope)...	+ 6.10	125	Middle Atlantic	- 8.40	78
Southern Plateau	+ 0.50	106	South Atlantic	- 5.40	89
			East Gulf	- 5.10	90
			West Gulf	- 6.60	83
			Ohio Valley and Tenn....	- 11.40	71
			Lower Lakes	- 8.60	70
			Upper Lakes	- 8.40	71
			North Dakota	- 1.90	89
			Upper Mississippi	- 9.00	71
			Missouri Valley	- 5.20	82
			Northern Slope	- 0.70	95
			Middle Slope	- 1.60	92
			Middle Plateau	- 1.60	83
			Northern Plateau	- 4.10	79
			North Pacific	- 7.60	83
			Middle Pacific	- 2.60	88
			South Pacific	- 2.80	78

The total snowfall at each station is given in Table II. Its geographical distribution is given on Chart No. VI of "Total monthly snowfall." The isotherms of minimum 32° and 40° are also shown on this chart.

HAIL.

The following are the dates on which hail fell at one or more stations in the respective States:

Arizona, 3, 4, 27. California, 15, 16, 20. Illinois, 11. Indian Territory, 27. Iowa, 11. Kansas, 22, 26. Kentucky, 11, 27. Maine, 28. Massachusetts, 17. Michigan, 8. Missouri, 24, 26. Nevada, 15, 19, 20. New York, 9, 17. Ohio, 9, 11, 15, 27. Oklahoma, 27. Utah, 3, 19, 22. West Virginia, 31.

SLEET.

The following are the dates on which sleet fell at one or more stations in the respective States:

Arkansas, 30. California, 21. Colorado, 22. Georgia, 30. Illinois, 24, 31. Indiana, 31. Iowa, 11. Kansas, 22, 30. Mary-